

REMARKS

Upon entry of this Amendment, claims 1-12 are pending. Claims 1-12 are amended. In the April 12, 2007 Office Action, the examiner:

- objected to the specification and claims based on informalities;
- objected to claims 2, 5 and 9 because they discuss multiple targets, whereas the disclosure states a method and system for one target;
- rejected claims 1-3, 7-10 and 12 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 4,166,783 to Turner (“the Turner patent”) in view of U.S. Patent No. 5,478,455 to Actor et al. (“the Actor patent”);
- rejected claims 4-6 and 11 under 35 U.S.C. § 103(a) as unpatentable over the Turner patent in view of the Actor patent, and further in view of U.S. Patent No. 6,610,181 to Besser et al. (“the Besser patent”).

I. Objections

A. The disclosure stands objected to. The examiner states that the symbol “Δ” is informal, since the examiner is unsure whether it relates to rate of change, change in heat or something else similar in nature.

The symbol “Δ” refers to “change.” (See paragraphs [0013], [00014]) Thus, for example, “Δ wafers” refers to the number of wafers fabricated per unit of deposit time (i.e., change in the number of wafers), while “Δ target lifetime,” refers to change in target lifetime. (See *id.*) Thus, since the meaning of the symbol “Δ” may be ascertained from the specification as-filed, applicants request that this objection be withdrawn.

B. Claims 1-12 stand objected to. The examiner states that it is unclear whether the symbol “Δ” relates to rate of change, change in heat, or something else in nature.

Independent claims 1 and 12 have been amended to eliminate the symbol “Δ,” and thus, applicants request that this objection be withdrawn.

C. Claims 2, 5 and 9 stand objected to because they discuss recording criteria in a table for multiple targets in respective multiple ones of the tool, whereas the disclosure states the method and system for one target.

Applicants note that page 4, paragraph [0022] of the instant specification discloses a multi-tool embodiment, specifically stating:

“Fig. 3 discloses a system (300) for determining a trend toward target overrun. The system (300) includes a PVD tool (302) representing one of a series of PVT tools N1, N2, . . . Nn.”

Thus, applicants believe that claims 2, 5 and 9 are supported by the specification, and request that the objections to these claims be withdrawn.

II. Rejections

A. Claims 1-3, 7-10 and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Turner patent in view of the Actor patent.

I. Independent claim 1

Independent claim 1 recites, *inter alia*,

“ . . . selecting criteria for a minimum accumulating rate of a number of wafers fabricated per unit of deposit time by a change in target life for a target in the tool;
recording actual values of the number of wafers fabricated per unit of deposit time by the change in target life for a target in the tool; for a time period;
comparing a calculated reported accumulating rate with a calculated minimum accumulating rate; and
deciding whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate.”

Independent claim 1 is patentable over the Turner and Actor patents, because those patents, taken alone or in combination, fail to disclose, teach or suggest “ . . . comparing a calculated reported accumulating rate with a calculated minimum accumulating rate; and deciding whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate.”

Rather, the Turner patent discloses a system for stabilizing the sputtering rate at a desired level. (See the Turner patent, col. 1, lines 41-43.) An empirical relationship of deposition rate to the cumulative history of the type of cathode is retained by the computer and accessed by the computer *to correct the power dissipated in the sputtering discharge* in order to maintain the desired deposition rate from the installed cathode. (See *id.*, col. 1, lines 48-53.) (emphasis added) The Turner patent does note that “when usage of the cathode exceeds a predetermined amount the computer branches to a stop condition.” (See *id.*, col. 3, lines 41-43.) But contrary to the examiner’s assertion, such a hard stop condition does not disclose, teach or suggest the claimed “comparing the reported accumulating *rate* with the minimum accumulating *rate*; and deciding whether to replace the target when the reported accumulating *rate* is less than the minimum accumulating *rate*,” as required by claim 1. (emphasis added)

The Actor patent fails to remedy this deficiency, because it simply discloses a method for controlling a sputtering source so that the property of the films deposited by the source on a series of substrates does not vary among the substrates. (See the Actor patent, col. 3, lines 39-43.) The Actor patent states that “software may be written to further include a formula for compensating for changes in deposition rate associated with aging of the sputter target,” (see *id.*, col. 3, lines 63-65), however, it is devoid of any disclosure of “comparing [a] reported accumulating rate with [a] minimum accumulating rate; and deciding whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate,” as required by claim 1.

Thus, because the Turner and Actor patents, taken alone or in combination, fail to disclose, teach or suggest all of the limitations of independent claim 1, applicants request that the 35 U.S.C. § 103(a) rejections of these claims be withdrawn. With respect to claims 2, 3 & 7-10, which depend from independent claim 1 and recite additional features of the invention, applicants request that the 35 U.S.C. § 103(a) rejections of these claims be withdrawn for the same reasons stated for independent claim 1.

2. Independent Claim 12.

Independent claim 12 recites, *inter alia*,

“ . . . a mapping table of criteria for a minimum accumulating rate of a number of wafers fabricated per unit of deposit time by the change in target life for a target in the tool;

a database recording the number of wafers fabricated per unit of deposit time by the change in target life for a target in the tool; and

a computer retrieving the criteria from the mapping table and entering the criteria in the database;

wherein the tool is configured to (a) compare a calculated reported accumulating rate with the minimum accumulating rate; (b) report the number of wafers fabricated per unit of deposit time by the change in target life for a target in the tool for comparison with the criteria; and (c) deciding whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate.”

Independent claim 12 is patentable over the Turner and Actor patents, because those patents, taken alone or in combination, fail to disclose, teach or suggest a “tool . . . configured to (a) compare a calculated reported accumulating rate with the minimum accumulating rate; (b) report the number of wafers fabricated per unit of deposit time by the change in target life for a target in the tool for comparison with the criteria; and (c) decide whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate,” as required by claim 12.

Rather, the Turner patent discloses a system for stabilizing the sputtering rate at a desired level. (See the Turner patent, col. 1, lines 41-43.) An empirical relationship of deposition rate to the cumulative history of the type of cathode is retained by the computer and accessed by the computer *to correct the power dissipated in the sputtering discharge* in order to maintain the desired deposition rate from the installed cathode. (See *id.*, col. 1, lines 48-53.) (emphasis added) The Turner patent does note that “when usage of the cathode exceeds a predetermined amount the computer branches to a stop condition.” (See *id.*, col. 3, lines 41-43.) But contrary to the examiner’s assertion, such a hard stop condition does not disclose, teach or suggest the claimed “compar[ing] the reported accumulating *rate* with the minimum accumulating *rate* . . . and . . . decid[ing] whether to replace the target when the reported accumulating rate is less than the minimum accumulating *rate*,” as required by claim 12. (emphasis added)

The Actor patent fails to remedy this deficiency, because it simply discloses a method for controlling a sputtering source so that the property of the films deposited by the source on a series of substrates does not vary among the substrates. (*See* the Actor patent, col. 3, lines 39-43.) The Actor patent states that “software may be written to further include a formula for compensating for changes in deposition rate associated with aging of the sputter target,” (*see id.*, col. 3, lines 63-65), however, it is devoid of any disclosure of “compar[ing] [a] reported accumulating rate with [a] minimum accumulating rate; and decid[ing] whether to replace the target when the reported accumulating rate is less than the minimum accumulating rate,” as required by claim 12.

Thus, because the Turner and Actor patents, taken alone or in combination, fail to disclose, teach or suggest all of the limitations of independent claim 12, applicants request that the 35 U.S.C. § 103(a) rejections of these claims be withdrawn.

B. Claims 4-6 and 11 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Turner patent in view of the Actor patent, and further in view of the Besser patent.

Claims 4-6 and 11 depend from independent claim 1, and thus contain all of the limitations of that base claim. As stated above, the Turner and Actor patents fail to disclose, teach or suggest all of the limitations of independent claim 1. The Besser patent fails to remedy the deficiencies in the Turner and Actor patents because it is directed to a method of controlling the thickness of deposited metal layers by using x-ray fluorescence (XRF) measurements, and is devoid of any disclosure of determining when or if a target should be replaced. (*See* the Besser patent, col. 3, lines 50-52.)

Since the Turner, Actor and Besser patents, taken alone or in combination, fail to disclose, teach or suggest all of the limitations of the rejected claims, applicants request that the 35 U.S.C. § 103(a) rejections be withdrawn.

Reconsideration and allowance of the pending claims is respectfully requested in view of the above amendments and remarks. If a telephone conference would be of assistance in

advancing prosecution of the above-captioned application, the examiner is invited to call the undersigned attorney at (609) 631-2491.

No fee is believed due with this submission, however, should any fees be required, the Commissioner for Patents is hereby authorized to charge any such required fees to deposit account **04-1679**.

Respectfully submitted,

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